Interplay between tectonics and diagenetic modification of the Natih Formation carbonates in the Jabal Qusaybah (Oman), with special emphasis on dolomitisation

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The Natih Formation (Cenomanian-Turonian) constitutes giant oil fields in North Oman. For this reason this formation has been extensively studied both in outcrops and analogues in the Oman foothills and in subsurface. Studies in subsurface have proven that reservoir properties were controlled by fracturing, late leaching and late dolomitization. Late dolomitization has been recorded as volumetrically insignificant, although relevant higher permeabilities along dolomitized pressure solutions favoured circulation of late leaching fluids, which enhanced reservoir properties. The results that are presented in this poster are integrated in a three year project that aims to characterise the interplay between fault and fracture dolomitization, their spatial patterns and the source of the dolomitization fluids in the Jabal Qusaybah outcrop analogues.

The Jabal Qusaybah is affected by major NE-SW and N-S fault zones. The latter dominantly occur in the central part of the structure, creating displacements of tens of meters between individual fault blocks. The N-S and NE-SW fault system is relatively young. Along these major faults, the circulation of different fluids is recorded by several events of calcite and dolomite cementation. Dolomitisation is virtually not affecting the host rock, apart from selective dolomitisation of bioturbated facies close to the faults, the top Natih C cross-bedded grainstones and the top Natih A. The dolomitised top Natih C interval is locally up to 2,5m thick and possesses good reservoir characteristics. Whether the fault related and the replacive dolomite in the top Natih C grainstones are of the same origin is under investigation.

The interplay between tectonics and diagenetic modification of the Natih Formation carbonates in Jabal Qusaybah will be based on the integrated multiscale structural and diagenetic evolution including the paragenetic evolution of cement fill of the recognised fault and fracture zones. Specific points that will be addressed include: 1) possible role of salt movements in the formation of the Jabal Qusaybah structure; 2) source and temperature of dolomitising fluids; 3) evolution of the fluid system.